

# 2nd Place Solution to Google Landmark Retrieval 2021

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Yuqi Zhang, Xianzhe Xu, Weihua Chen, Yaohua Wang, Fangyi  
Zhang, Fan Wang and Hao Li



# Introduction

From person re-identification to landmark retrieval



Cropped, fine-grained, color important



Un-cropped, alignment, color, shape, texture

Common solutions:

Gradually enlarge input size and data scale, strong backbones, Arcface...

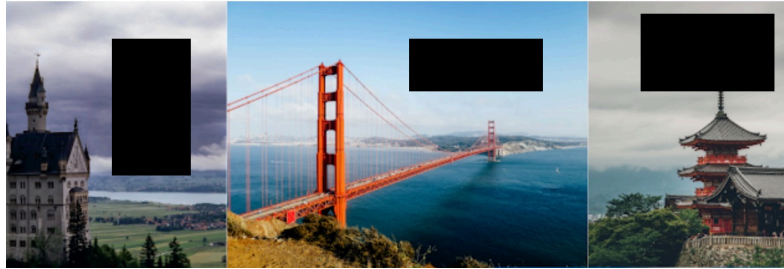
New Contributions:

- (1) Bag-of-tricks from person re-identification
- (2) Continent-aware sampling strategy
- (3) Landmark-Country aware reranking

# Bag-of-tricks from person re-identification

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Random Erasing, label smooth, triplet loss, IBN-extension, last stride=1, etc.



Random Erasing

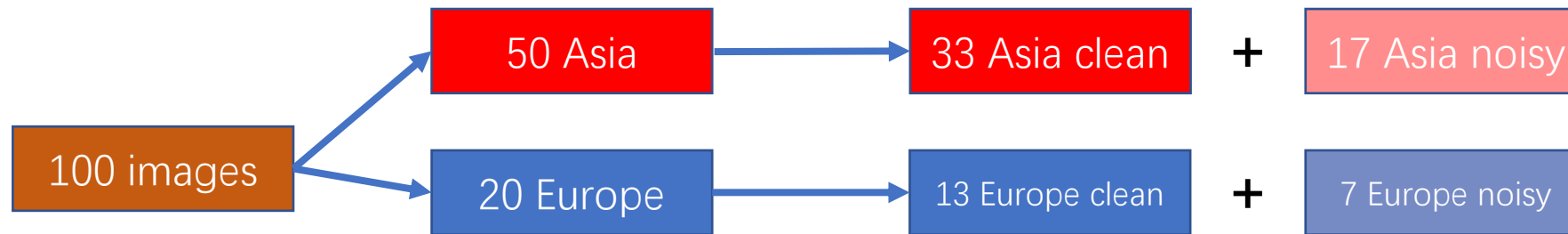
Setting	Validation	Public	Private
baseline	32.60	28.44	30.59
+RE	32.78	29.29	30.60
+label smooth	32.55	28.21	29.79

Effect of different tricks on landmark retrieval

RE is useful while label smoothing is harmful

# Continent-aware sampling strategy

- (1) Sample continent images by a fairer ratios[1]. Favor Asia
- (2) Set 0.66 probability for clean data and 0.33 probability for noisy data



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Setting	Validation	Public	Private
id-uniform	31.05	24.78	27.28
softmax	32.60	28.44	30.59
continent-aware	33.07	31.37	32.44

Effect of different sampling strategy

Id-uniform harmful, softmax sampler good, continent-aware better

# Landmark-Country aware reranking

(1) Query soft voting of landmark and country tag from GLDv2

$$score_j = \sum_i^k sim_{i==j}$$

(2) Enhance index images with the same landmark-country as query.  
Soft score addition instead of hard manner[2]

$$sim_{final} = sim + \alpha \times L_{score} + \beta \times C_{score}$$



Query image  
Jiangsu Chenghuangmiao, 0.7  
China: 0.9



Index image: 0.7 raw sim  
Jiangsu Chenghuangmiao  
China



Index image: 0.6 raw sim  
Sarala Temple  
India



Index image: 0.5 raw sim  
Pingyao Chenghuangmiao  
China



Index image: 0.1 raw sim  
Jiangsu Chenghuangmiao  
China



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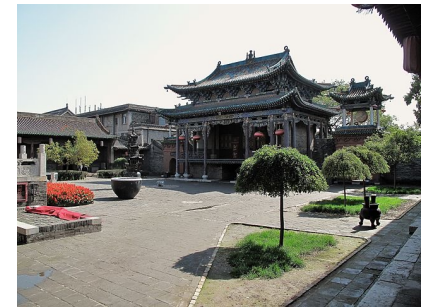
0.7+ $\alpha$ \*0.7  
Jiangsu Chenghuangmiao  
China



0.1+ $\alpha$ \*0.7  
Jiangsu Chenghuangmiao  
China



0.6  
Sarala Temple  
India



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0.1+ $\alpha$ \*0.7 +  $\beta$ \*0.9  
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





















0.5+ $\beta$ \*0.9  
Pingyao Chenghuangmiao  
China



0.6  
Sarala Temple  
India

# Results

<div>■ Gold   ■ Silver   ■ Bronze</div>								
#	△pub	Team Name	Notebook	Team Members	Score ?	Entries	Last	
1	—	Dieter			0.53751	81	7d	
2	▲ 2	ZhangWesley		    	0.52995	105	6d	
3	—	All Data Are Ext		  	0.52903	90	7d	
4	▼ 2	bestfitting			0.52610	137	7d	
5	—	underfitting	</> Google Landmark 5...	 	0.50825	205	7d	
6	▲ 1	Rist Kaggle team		  	0.50751	36	7d	
7	▲ 1	NotEnoughFitting		 	0.50025	94	7d	
8	▲ 1	gpushare.com		   	0.49572	148	7d	
9	▲ 1	Eduardo e Matheus		 	0.49429	69	7d	
10	▼ 4	goodenoughfitting		    	0.48781	84	7d	



**Thanks!**